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Edwin Dunkin, F.R.S., President, in the Chair.

Professor W. Steadman Aldis, M.A., University College, Auckland, New Zealand;
Lieut. Henry Edward O'Neill, R.N., Mozambique; and
William Peck, 6 Hanover Street, Edinburgh;

were balloted for and duly elected Fellows of the Society.

On the Proposed Change of the Astronomical Day. By Professor Theodor von Oppolzer.

As my views differ in some points from those which Professor Newcomb has given on page 122 of this volume of the *Monthly Notices*, I avail myself of the occasion to state in a few lines my own views on this subject. I fully agree with Professor Newcomb that the universal day will prove a great convenience, and I even think that its use will not remain limited to the reckoning of physical and meteorological phenomena, but that the time will come before long when it will be possible to introduce it, not only as railway and telegraph standard time, but as the regulator of everyday life—a hope which Mr. Sandford Fleming has so well expressed at the conference held at Washington, that I will repeat his own words. "The intelligence of the people will not fail to discover before long that the adoption of correct principles of time-reckoning will in no way change or seriously affect the habits they have been accustomed to. It will certainly sweep away nothing valuable to them. The sun will rise and set to regulate their social affairs; all

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classes will soon learn to understand the hour of noon, whatever the number on the dial, whether six as in scriptural times, or twelve or eighteen or any other number. People will get up and retire to bed, begin and end work at the same periods of the day as at present, and our social habits and customs will remain without a change, depending as now on the daily returning phenomena of light and darkness." For such purposes, for the wants of civil life, the present astronomical day of Greenwich is out of the question, as the change of date would, throughout all Europe, coincide with the busiest hours of the natural day, whilst by the adoption of the Greenwich civil day, as proposed by the conference, the change of date at noon (a very inconvenient thing) takes place only in some islands of the Pacific ocean. So this day, beginning at Greenwich mean midnight, seems to me to be the only one practicable for serving as a universal standard of time. But when once such a universal time is introduced for all purposes, it is quite natural that the question must arise if there is indeed so great a necessity to retain in astronomy, and only in astronomy, a different reckoning of time. I fail to see this necessity, and I do not think that it would cause any serious trouble or confusion if a change were to be made in our astronomical reckoning, whilst a special mode of reckoning time in one science only, when all others use the generally adopted standard, will, without doubt, be a source of error and confusion. It is true that the astronomical and civil reckonings do not now agree, and that we are so accustomed to this circumstance that it but rarely leads to error. But nowadays one is obliged, when seeing an indication of an hour, to ask immediately to what meridian it belongs; we are accustomed to bear constantly in mind that there are as many times as there are meridians, and so we naturally also take heed if it is astronomical or civil time. But when we have ceased to ask on which meridian an indication of time is based, when we have learned to consider time as a given, absolute quantity, independent of locality, we may sometimes forget that there exists a special astronomical time. It is not quite right that astronomical ephemerides should form a department by themselves; they are used not only by seamen (and, for instance, in the United States navy the day is reckoned from midnight, as Rear-Admiral Rodgers states on page 176 of the Protocols of the Proceedings of the Prime Meridian Conference), but also for all sorts of calendars and other publications destined for general use, so that the difference of twelve hours may often lead to serious misunderstandings. So, for instance, when the date of an eclipse is given in astronomical reckoning, the historian, who has nearly always to do only with eclipses happening in Europe, Asia, and Northern Africa, will often find that the eclipse was a day earlier than the day which is spoken of in history, and that it happened on Sunday, whilst the records speak of a Monday.

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The discontinuity which will arise from the adoption of universal time in the astronomical ephemerides would for all other publications than the *Nautical Almanac* be the same if Greenwich astronomical time were to be adopted; so, for instance, the *Connaissance des Temps*, the *Berliner Jahrbuch*, &c., will not suffer a greater discontinuity on the introduction of universal than on that of Greenwich astronomical time; and when all other publications are obliged to make a change in their reckoning, I do not see why it should be so very objectionable that the *Nautical Almanac* itself should also make a change. The astronomer of 20 or 100 years hence will not want to "bear it in mind" which reckoning of time is adopted for the given epoch, for every page of the ephemeris he is making use of will tell it him, if care is only taken, when the change is adopted in the *Nautical Almanac*, and when it passes from Greenwich time to universal time, to change also the heads of the columns, and to write instead of "mean Greenwich time," "universal time," thus clearly indicating which reckoning is employed. I entirely agree with Professor Newcomb that the data on page ii of the month should be given for Greenwich midnight instead of Greenwich noon, and that the sidereal time should be that for Greenwich midnight; also the columns on page iv should be interchanged, and the hours on pages v to xviii reckoned from midnight. But I think further that these columns should no longer bear the heading "mean Greenwich midnight," and "mean Greenwich noon," but "0^h universal time" and "12^h universal time," thus clearly indicating which reckoning of time is employed. The words *midnight* and *noon* have a purely local character like the words *evening* and *morning*; at a given instant it can be 0^h on the whole earth, if we have agreed to designate this given instant everywhere with this number, but there can be midnight only under one meridian at the same absolute instant; so the words *midnight* and *noon* are to be avoided when speaking of universal time. On page i of the month we might perhaps say, instead of "apparent noon," "at upper transit at Greenwich," as this is employed in other parts of the *Nautical Almanac*. When these indications are made, a single glance at the head of the column will inform everyone, who in future times makes use of the *Nautical Almanac*, whether the book he works with is still based on "Greenwich mean time," or already on "universal time," so that an error is nearly impossible. Indeed, I never heard of an error being caused, for instance, by the circumstance that the tables of *Jupiter*, *Saturn*, and *Uranus*, by Bouvard, or the tables of *Jupiter's* Satellites, by Damoiseau, which are used in the computations for the *Nautical Almanac*, take midnight as the initial epoch. As to the ephemerides of the planets, they ought surely, as Professor Newcomb suggests, for the sake of interpolation to be given for "0^h universal time," but I do not see any disadvantage or serious trouble which could arise from this break of half a day in the

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series of ephemerides, nor do I think it a very important thing that the precepts concerning time in our books on practical astronomy should be changed. Changes occur in other branches of science which necessitate more important alterations in the respective books, and they are made in new editions without the least confusion arising. I think that generally we are more inclined to *over* than to *under* estimate the trouble of a transition period; and I think the uniformity of astronomical and civil reckoning is surely worth the little trouble we shall have to overcome, at the beginning of the change, until the new reckoning is firmly rooted in all minds.

On the Right Ascensions of the Cape Catalogues for 1850 *and* 1880.

By A. M. W. Downing, M.A.

In the Introduction to the Cape Catalogue for 1850 Mr. Gill gives a comparison between the R.A.'s of that Catalogue and of the Cape Catalogue for 1880. From this it appears that there is a considerable discordance between the R.A.'s of these Catalogues depending on N.P.D. From certain other comparisons which he makes Mr. Gill concludes that the results of the Dollond Transit Instrument (contained in the 1850 Catalogue) may be accepted with considerable confidence, and appears to consider that the discordance in question is probably due to variation in the plane of collimation in the Cape Transit Circle at different altitudes, and that therefore the discordances between the R.A.'s of the 1850 and 1880 Catalogues arise from errors in the latter. Without wishing to enter into any controversy on the subject, I desire to lay before the Society some evidence, taken from comparisons of southern catalogues which I happened to have by me, which appears to throw some light on this matter. And first for the Cape Catalogues for 1850 and 1880. I have made use of the materials on pp. viii and ix of the Introduction to the 1850 Catalogue, taking the mean differences of R.A. for every 6° of N.P.D. I thus obtain the following mean differences:—

Mean N.P.D.	Mean $\Delta\alpha$ 1880−1850.	Number of Stars.	Mean N.P.D.	Mean $\Delta\alpha$ 1880−1850.	Number of Stars.
° ′	s		° ′	s	
92 55	−0·007	144	141 0	−0·164	313
98 51	− ·026	139	147 1	− ·080	296
104 58	− ·027	112	151 42	− ·062	245
112 5	− ·056	147	158 43	− ·064	188
116 51	− ·079	502	164 46	− ·027	77
122 37	− ·100	393	170 14	+ ·084	58
129 4	− ·131	358	176 38	−0·347	15
134 55	−0·149	381			